

Amendments to the Claims:

Claim 1 (Currently Amended) A method for tracking the trajectory in three-dimensions and in time of an object in a sample volume comprising the steps of:

- a) recording a time-spaced sequence of digital in-line holograms of the sample volume, generating a sequence of N holograms;
- b) in each successive pair of holograms in the sequence of N holograms, subtracting from a first hologram in the pair a second hologram in the pair [in each successive pair of the sequence of N holograms] to generate N/2 difference holograms;
- c) summing the N/2 difference holograms to generate a summed hologram; and
- d) numerically reconstructing images of the object at a plurality of depths into the sample volume representing the trajectory of the object from the summed hologram.

CLAIM 2 (Currently Amended) A method for tracking the trajectory in three-dimensions and in time of an object in a sample volume comprising the steps of:

- a) recording a time-spaced sequence of digital in-line holograms of the sample volume, generating a sequence of N holograms;
- b) subtracting a first hologram, selected from the sequence of N holograms, from each of the remaining holograms of the sequence of N holograms to generate N-1 difference holograms;
- c) summing the N-1 difference holograms to generate a summed hologram; and
- d) numerically reconstructing images of the object at a plurality of depths into the sample volume representing the trajectory of the object from the summed hologram.

CLAIM 3 (Currently Amended) A method for tracking the trajectory in three-dimensions and in time of an object in a sample volume comprising the steps of:

- a) recording a time-spaced sequence of digital in-line holograms of the sample volume, generating a sequence of N holograms;
- b) subtracting a first hologram, selected from the sequence of N holograms, from each of the remaining holograms of the sequence of N holograms to generate N-1 difference holograms;

- c) numerically reconstructing an image of the object at a depth into the sample volume for each of the N-1 difference holograms, generating N-1 subject images; and
- d) combining the N-1 subject images to generate a 3-D image representing the trajectory of the object.

CLAIM 4 (Currently Amended) A method for tracking the trajectory in three-dimensions and in time of a plurality of objects in a sample volume comprising the steps of:

- a) recording a time-spaced sequence of digital in-line hologram of the sample volume [as a first series of pixels in a buffer];
- b) generating a summed hologram by, for each hologram in the [a subsequent] time-spaced sequence of digital in-line holograms, [recording each] representing the hologram in the sequence [represented] as a [second] series of pixels [by] corresponding to the summed hologram and:
 - subtracting each pixel in the [second] series of pixels from a corresponding pixel in the summed hologram [buffer], for a hologram having an even ordinal number in the sequence of digital in-line holograms; and
 - adding each pixel in the [second] series of pixels to a corresponding pixel in the summed hologram [buffer], for a hologram having an odd ordinal number in the sequence of digital in-line holograms; and
- c) numerically reconstructing images of the plurality of objects, [object] at a plurality of depths into the sample volume, representing the trajectories of the objects, from the summed hologram [trajectory of the object].

CLAIM 5 (Currently Amended) The method of any one of claims 1 to 4, wherein the [steps] step of reconstructing uses a Kirchhoff-Helmholtz transform to obtain an image at a reconstruction plane for each of the plurality of depths in the sample volume.